an optical nanoparticle, a MRI-active nanoparticle, and optionally comprises a catalytic element,

introducing a sample suspected of comprising an analyte into the sample zone, wherein the analyte combines with the coded magnetic affinity complex to form a coded magnetic binding complex,

activating a microcoil array or a mechanically movable permanent magnet functionally coupled to the fluidic network to thereby move the coded magnetic binding complex to a first affinity surface without fluidic movement of a fluid in the plurality of the fluidic zones, forming a bound coded magnetic binding complex,

detaching the code from the bound coded magnetic binding complex,

providing a magnetic signal affinity complex, wherein the detached code binds to the magnetic signal particle to form a coded magnetic signal binding complex,

activating the microcoil array or mechanically movable permanent magnet to move the coded signal binding complex to the detection zone comprising a second affinity surface, forming a bound coded signal binding complex, and

detecting the bound coded signal binding complex within the detection zone using a detection element functionally coupled to the fluidic network.

20. The method of claim **19**, wherein the magnetic signal affinity complex comprises a SERS-active nanoparticle or a fluorescent nanoparticle.

21. The method of claim **19**, wherein the magnetic signal affinity complex comprises a catalytic element.

22. The method of claim **21**, wherein the catalytic element is selected from the group consisting of alkaline phosphatase, horseradish peroxidase, glucose oxidase, glucose oxidase and horseradish peroxidase, firefly luciferase, *Renilla luciferase*, bacterial luciferase, an enzyme or analogs or combinations thereof.

23. The method of claim **21**, wherein the catalytic element is conjugated through a functionalized polymer.

24. The method of claim **21**, wherein a reaction substrate for the catalytic element is in the detection zone.

25. The method of claim **24**, wherein the reaction substrate is selected from the group consisting of Lumi-Phos 480, Lumi-Phos 530, Lumi-Phos Plus, Lumi-Phos APS-5, Lumigen TMA-6, Lumigen PS-atto, Lumigen PS-1, Lumigen PS-2, Lumigen PS-3, H_2O_2 with an oxidizable compound, Lumi-Gal 530, Amplex Red, 3,5,3',5'-tetramethylbenzidine (TMB), glucose, O_2, ATP, Mg^{2+}, luciferin, aminoluciferin, quinolinyl lucifiern, coelentrazine, aldehyde, $FMNH_2$, and analogs and derivatives, and combinations thereof.

26. The method of claim **21**, wherein the fluidic zones contain an appropriate buffer.

27. The method of claim **19**, wherein the coded magnetic binding complex and/or the coded signal binding complex are moved to a cleaning zone by activating the microcoil array or mechanically moveable permanent magnet, wherein the vibration element is activated to aggregate and de-aggregate the complex to thereby remove unbound coded magnetic affinity complex, detached code, and/or magnetic signal affinity complex.

28. The method of claim **19**, wherein the detection element is an optical detection element or an electrical detection element.

29. A method of detecting an analyte, comprising

providing a magnetic signal affinity complex in a fluidic network comprising a plurality of fluidic zones, wherein the plurality of fluidic zones comprises a sample zone, a cleaning zone, and a detection zone, wherein the fluidic network is functionally coupled to a vibration element, and wherein the magnetic signal affinity complex comprises a SERS-active nanoparticle, a fluorescent nanoparticle, and/or comprises a catalytic element,

introducing a sample suspected of an analyte into the sample zone, wherein the analyte combines with the magnetic signal affinity complex to form a magnetic signal binding complex,

activating a microcoil array or a mechanically movable permanent magnet functionally coupled to the fluidic network to thereby move the magnetic signal binding complex to the detection zone without fluidic movement of a fluid in the plurality of the fluidic zones,

detecting the presence of the binding complex within the detection zone using a detection element functionally coupled to the fluidic network, wherein the detection element is a optical detection element or an electrical detection element.

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